

SUMMARY

It is postulated that there is sufficient evidence to show that fire as a factor affecting plants is one that has been in existence from remote times, and that the flora of Australia, in part, is pyrophilous. The growth form of the mallee *Eucalyptus*, its power of repeated regeneration almost indefinitely from its woody stock by means of adventitious shoots, and its habitat, all favour this theory. The structure of the fruit in certain primitive families well illustrates the adaptation of the plant to fire, and will allow of no other explanation. The general response of the flora following burning of a periodic nature, including the existence of several species of the so-called "fire-bushes," still further supports this theory. Evidence has been advanced showing that absolute protection from fire in the thicket formations has a detrimental effect on the vegetation.

ADDITIONS TO KNOWLEDGE OF THE RANGES OF WESTERN AUSTRALIAN MAMMALS

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Accurate knowledge of the geographic distribution of animals enables the zoologist to define their ecological requirements and limitations. This information is indispensable to the palaeontologist who attempts a palaeo-ecological reconstruction of a fauna. The changes in the areal distribution of animals through time are often indications of changes in the environment.

European settlement and the introduction of European animals have resulted in the disappearance of the Australian fauna over much of its range. Unfortunately, insufficient collecting was done before this disappearance to accurately define the ranges of many species. In many cases this information is irretrievably lost. However, valuable information on mammalian distribution has been contributed by Shortridge (1910), Glauert (1934) and Tate (1947, 1948, 1951). To this it is possible to add some information on animal distribution from the recent bones found in caves along the south and west coasts of Western Australia.

The material upon which this study is based was collected from cave deposits extending along the west coast from Jurien Bay to Cape Lecuwin, and along the Eyre Highway from Cockle-biddy Tank to Eucla. These bones are the remains of prey brought in by owls and carnivores which used the caves for shelter. The nocturnal mammalian fauna is probably well represented in the owl pellet deposits, as owls are known to be good collectors. The larger marsupials are usually represented by juveniles which would be easier to capture. Introduced forms such as rabbits and *Mus musculus* occur on the surface in every cave.

Only specimens from the topmost one foot and the surface are considered in this study. The time interval represented by this thickness of sediment is probably not great. The assemblages

found in these caves are believed to represent the fauna in those areas before the effect of the introduced species was felt. The identification of these specimens from measurements and other characters will be discussed in a later paper.

Specimens were collected from the following caves:

Hastings' Cave—4 miles inland from Jurien Bay.

Wedge's Cave—Mimegara, south-west of Dandaragan.

Yanehep Cave—Yanehep State Park.

Lake Cave—7 miles south-west of Withecliffe.

Murracllelevan Cave—4½ miles west of Cocklebiddy Tank on the Eyre Highway.

Madura Cave—6 miles south of Madura.

Webb's Cave—Mundrabilla Station.

AbraKurrie Cave—25 miles north of Eucla.

The ranges of some of the species are given on maps (Figures 1-11). In the maps the following abbreviations are used for localities:—P = Perth, A = Albany, M.R. = Margaret River, D = Dandaragan, J.B. = Jurien Bay, G = Geraldton, C = Carnarvon, K = Kalgoorlie, C.T. = Cocklebiddy Tank, M = Madura, E = Eucla.

Family MACROPODIDAE

Subfamily Potoroinae

Bettongia penicillata (Gray).—This species has not been previously recorded north of Perth. Skeletal remains are present in Yanehep Cave and at Jurien Bay to the north, and in Webb's Cave to the east of its formerly known range.

Bettongia lesueuri (Quoy and Gaimard).—Remains of this species are found in caves as far north as Yanehep and as far east as Eucla. Its previously known range was the south-western area, with outliers in the Sharks Bay and Roebuck Bay areas.



Figure 1.—Geographic range of *Bettongia penicillata* (horizontal lines) and *Bettongia lesueuri* (vertical lines). Only the south-western part of the range of the latter species is figured.



Figure 2.—Geographic range of *Potorous platyops*.

Potorous platyops (Gould).—Previously recorded from the vicinities of Goomalling (see Calaby, 1954) and Albany. Bones of this species are found in Webb's Cave. This indicates that *P. platyops* within recent time had a fairly wide range consisting of an inland belt extending south of Goomalling and east of Albany to Mundrabilla. This species is also found in caves at Mimegara and Jurien Bay in a lower layer, which is possibly somewhat older, and should not be considered here. These specimens will be treated in a later paper when C¹⁴ dates become available for them.

Caloprymnus campestris (Gould).—This is the first record of this species in Western Australia. Skeletal remains are common on the surface in Webb's Cave. This represents a considerable extension of its range from the type area in north-eastern South Australia. It probably had a wide range in the desert areas before the introduction of European mammals.

Family PHALANGERIDAE

Pseudocheirus occidentalis (Thomas).—Bones of this species are found on the surface of Webb's Cave, thus extending its range to within 60 miles of the South Australian border. It was previously known from the lower South-West.



Figure 3.—Geographic range of *Pseudocheirus occidentalis*.



Figure 4.—Geographic range of *Antechinus flavipes* (vertical lines) and *Parantechinus apicatis* (horizontal lines).

Cercartetus concinna (Gould).—Mandibles of this animal occur in the surface material of Murraeellevan Cave, 135 miles east of Balladonia, its previously known easternmost locality.

Family DASYURIDAE

Antechinus flavipes (Waterhouse).—This species is found in the caves north of Perth as far as Jurien Bay. Its previous range was known from Perth to Cape Riche.

Phascogale calura (Gould).—This animal, formerly known from the lower South-West, is represented in caves along the Eyre Highway from Murraeellevan Cave to Webb's Cave at Mundrabilla Station.



Figure 5.—Geographic range of *Phascogale calura*.

Phascogale tapaotafa (Meyer).—In the South-West, the northernmost previously known locality was the Swan River. It is found in Wedge's Cave at Mimegara. It appears to be confined to the south-western part and in the Kimberley Division in Western Australia.

Dasyercus species.—Remains of this genus are present in the coastal eaves at Jurien Bay and Mimegara and in all the

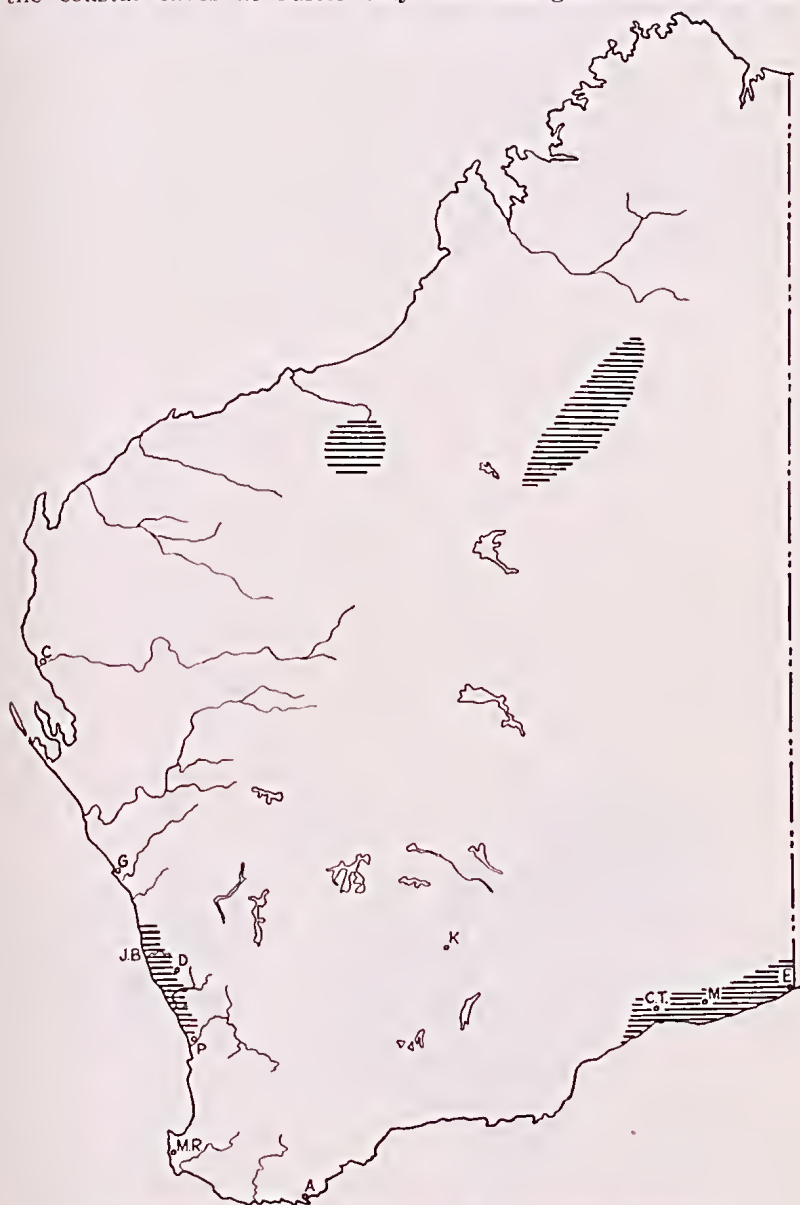


Figure 6.—Geographic range of *Dasyercus* species.

eaves along the Eyre Highway. This represents a huge extension of range as the genus was known previously, in Western Australia, only from the Canning Stock Route between Wells 26 and 47 (*D. cristicauda*) and the Pilbara Goldfields area (*D. blythi*). No specific identification is given to the present specimens as the genus is in want of revision. *D. blythi* may not be a good species as the only reliable character which separates it from *D. cristicauda* seems to be that the minute upper third premolar is present in half or more of the specimens of *cristicauda* but is always absent in *blythi*. It may be of interest to note that on this criterion the west coast material would be classified as *blythi* and the Nullarbor specimens as *cristicauda*.

Sminthopsis crassicaudata (Gould).—Remains were found in all the caves along the Eyre Highway from Murraelellavan Cave to Abrakurrie Cave. This species has a wide distribution in Western Australia east of the Darling Searp.

Sminthopsis hirtipes (Thomas).—This is a second desert species found in the caves at Jurien Bay and Mimegara. It was previ-



Figure 7.—Geographic range of *Sminthopsis hirtipes* (vertical lines) and *Sminthopsis crassicaudata* (horizontal lines).

ously known from the Canning Stock Route, west of the Warburton Ranges (126° 6' E; 26° 30' S) and South Australia.

Parantechinus apicalis (Gray).—This species is found in caves along the west coast from Yanhep to Jurien Bay. It was previously recorded from Victoria Plains, Moore River, Salt (= Pallinup) River and the Albany area. It appears to have occupied a strip of country along the coast as far south as Yanhep, then inland to Albany skirting the high rainfall area of the South-West corner. No remains are known from the Margaret River caves.

Family PERAMELIDAE

Perameles bougainvillei (Quoy and Gaimard) (including *nyosura* Wagner).—Bones are found in the caves from Cockle-biddy Tank to Eucla. This is another species that extends much farther east than its previously known range. The relationship of these specimens to *P. eremiana* should be investigated. It is possible that all of the Western Australian species of *Perameles*



Figure 8.—Geographic range of *Perameles bougainvillei*.

actually comprise one species with a number of geographic races.

Maerotis lagotis (Reid).—Remains of this species are found in the caves along the Eyre Highway. Its presence in this area is not unexpected, as it is known to occupy a large area in the interior of Australia.

Order CHIROPTERA

Macroderma gigas (Dobson).—This large bat was previously known from the northern portion of Australia to Alice Springs and the Pilbara district as a living animal and in superficial caves



Figure 9.—Geographic range of *Pseudomys (Gyomys) occidentalis*.

deposits as far south as Carrieton, near Port Augusta, in South Australia. It is represented in the surficial deposits of the west coast caves as far south as Yanhep.

Order RODENTIA

Pseudomys (Gyomys) occidentalis (Tate).—The type locality of this species is Tambellup in the South-West. It is present in the coastal caves from Yanhep to Jurien Bay. It probably occupied a considerable area in south-western Western Australia east of the high rainfall area.

Pseudomys (Thetomys) nanus (Gould).—This rodent, previously known from Victoria Plains, is present in caves from the Margaret River area to Jurien Bay.

Pseudomys (Pseudomys) shortridgei (Thomas).—This is an abundant species in all the caves along the west coast from Cape Leeuwin to Jurien Bay. It is known inland as far as Lake Bidy in the southern part of the State.



Figure 10.—Geographic range of *Pseudomys (Thetomys) nanus*.



Figure 11.—Geographic range of *Pseudomys (P.) rawlinnae* (vertical lines) and *Pseudomys (P.) shortridgei* (horizontal lines).

Pseudomys (Pseudomys) rawlinnae (Troughton).—The previously known localities for this species are Rawlinna and Ooldea along the Trans-Australian Railway. Their remains are found in the eaves along the Eyre Highway from Coeklebiddy Tank to Eucla. It apparently occupied a considerable area along the southern edge of the Nullarbor Plain.

Leggadina hermannsburgensis (Waite).—This species has been previously recorded from a wide area in Australia. One subspecies, *bolami*, has been recorded from the Nullarbor area (Ooldea, South Australia). The specimens of *Leggadina* found in the eaves from Coeklebiddy Tank to Eucla are referred to this species and subspecies on the basis of geographical proximity. Two specimens of *Leggadina* in the collections of the University of California at Los Angeles, U.S.A., were taken alive at the crossing of the Great Northern Highway over the Lyndon River, Western Australia, in 1954. The genus appears to have a wide distribution in the drier areas.

Leporillus apicatis (Gould).—Previously known from the Murray and Darling drainages, Aliee Springs and the MacDonnell Range, N.T., and from Mt. Crombie, South Australia. Remains are abundant in the eaves along the Eyre Highway from Coeklebiddy Tank to Eucla. It appears to have been very widespread in the southern half of Australia.

Leporillus conditor (Sturt).—This is a common species in the Nullarbor eaves. It has previously been recorded as far west as Fisher in South Australia.

The range extensions listed above indicate that a number of species of Western Australian mammals have a wider range than was previously known. Several species, such as *Dasyercus* sp. and *Sminthopsis hirtipes*, which are typical of the north-west desert areas, extend southward along the coastal sandplain to Yanehep. A number of species known from the desert areas of South Australia extend westward into Western Australia. Neither

of these extensions is unexpected when the environments of these areas are considered. Much of the coastal sandplain is a virtual desert, especially in the summer, due to the porous sandy soil which probably dries out to a considerable depth. The absence of barriers over much of the desert area of Australia should make it possible for animals adapted to a desert environment to spread over most of the interior of the continent, and a considerable fauna should be found in both Western and South Australia.

Some of the faunal elements of the south-western part of Western Australia extend farther northward and eastward than was formerly recorded. A number are known from the cave at Jurien Bay, and these species probably extended to Geraldton very recently. The existence of outliers in the Sharks Bay area implies an extension to that area in the not far distant past.

Several of the south-western species extend eastward as far as Eucla. This indicates that the strip of land along the south coast of Western Australia is not as unfavourable to these species as was formerly believed. These species probably possess a greater tolerance for dry conditions than is generally recognized. It is very likely that the Western Australian populations of these species were connected with the South Australian populations along this area up to the present time. Additional work in western South Australia is needed to settle this question. The cause of the recent disappearance of the native mammals in this area is unknown. It could be due to climatic change, the effect of introduced mammals, or both.

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